



SEQUENCE LISTING

<10> McCallum, Claire
Slade, Ann J.
Colbert, Trent
Knauf, Vic
Anawah Inc.

<120> Tomatoes Having Reduced Polygalacturonase Activity Caused by Non-
Transgenic Mutations in the Polygalacturonase Gene

<130> MBHB 02-276

<160> 50

<170> PatentIn version 3.1

<210> 1
<211> 7456
<212> DNA
<213> Lycopersicon esculentum

<220>
<221> CDS
<222> (1479) .. (1757)
<223>

<220>
<221> CDS
<222> (2416) .. (2547)
<223>

<220>
<221> CDS
<222> (3327) .. (3491)
<223>

<220>
<221> CDS
<222> (3696) .. (3716)
<223>

<220>
<221> CDS
<222> (4260) .. (4467)
<223>

<220>
<221> CDS
<222> (4567) .. (4648)
<223>

<220>
 <221> CDS
 <222> (5602)..(5710)
 <223>

<220>
 <221> CDS
 <222> (6139)..(6255)
 <223>

<220>
 <221> CDS
 <222> (6788)..(7045)
 <223>

<400> 1
 aagcttctta aaaaggcaaa ttgattaatt tgaagtcaaa ataattaatt ataacaatgg 60
 taaagcacct taagaaacca tagtttgaaa ggttaccaat gcgctatata ttaatcaact 120
 tgataatata aaaaaaattt caattcgaaa agggcctaaa atattctcaa agtattcgaa 180
 atggtacaaa actaccatcc gtccacctat tgactccaaa ataaaattat tatccacctt 240
 tgagttaaatt attgactact tatataacaa ttctaaattt aaactatttt aatactttta 300
 aaaatacatg gcgttcaaatt atttaatat atttaattta tgaatatcat ttataaacca 360
 accaactacc aactcattaa tcattaaatc ccacccaaat tctactatca aaattgtcct 420
 aaacactact aaaacaagac gaaattgttc gagtcogaat cgaagcacca atctaattta 480
 ggtagagccg catatttagg aggacacttt caatagtatt tttttcaagc atgaatttga 540
 aatttaagat taatggtaaa gaagtagtac accogaatta attcatgcct tttttaaata 600
 taattatata aatatttatg atttgtttta aatattaaaa cttgaatata ttatttttaa 660
 aaaaattatc tattaagtac catcacataa ttgagacgag gaataattaa gatgaacata 720
 gtgtttaatt agtaatggat gggtagtaaa tttatttata aattatatca ataagttaaa 780
 ttataacaaa tatttgagcg ccatgtattt taaaaaatat taaataagtt tgaatttaaa 840
 accgttagat aaatgggtcaa ttttgaaccc aaaagtggat gagaagggtt ttttagagcc 900
 aataggggga tgagaaggat attttgaagc caatatgtga tggatggagg ataattttgt 960
 atcatttcta atactttaaa gatatttttag gtcattttcc cttcttttagt ttatagacta 1020
 tagtgtagt tcatcgaata tcatctatta tttccgtctt aaattatttt ttattttata 1080
 aatttttaaa aaataaatta tttttccat ttaactttga ttgtaattaa tttttaaaaa 1140

ttaccaacat ataaataaaaa ttaatatatta acaaagaatt gtaacataat attttttttaa	1200
ttattcaaaa taaatatattt taaacatcat ataaaaagaaa tacgacaaaa aaattgagac	1260
gggagaagac aagccagaca aaaatgtcca agaaactctt tcgtctaaat atctctcatc	1320
caaactaata caatacccat tacaattaac catattgacc aactcaaacc ccttaaaatc	1380
tataaataga caaaccttcc ccatacctct tatcataaaaa aaaataataa tctttttcaa	1440
tagacaagtt taaaaacat accatataac aatatatc atg gtt atc caa agg aat	1496
Met Val Ile Gln Arg Asn	
1 5	
agt att ctc ctt ctc att att att ttt gct tca tca att tca act tgt	1544
Ser Ile Leu Leu Leu Ile Ile Ile Phe Ala Ser Ser Ile Ser Thr Cys	
10 15 20	
aga agc aat gtt att gat gac aat tta ttc aaa caa gtt tat gat aat	1592
Arg Ser Asn Val Ile Asp Asp Asn Leu Phe Lys Gln Val Tyr Asp Asn	
25 30 35	
att ctt gaa caa gaa ttt gct cat gat ttt caa gct tat ctt tct tat	1640
Ile Leu Glu Gln Glu Phe Ala His Asp Phe Gln Ala Tyr Leu Ser Tyr	
40 45 50	
ttg agc aaa aat att gaa agc aac aat aat att gac aag gtt gat aaa	1688
Leu Ser Lys Asn Ile Glu Ser Asn Asn Asn Ile Asp Lys Val Asp Lys	
55 60 65 70	
aat ggg att aaa gtg att aat gta ctt agc ttt gga gct aag ggt gat	1736
Asn Gly Ile Lys Val Ile Asn Val Leu Ser Phe Gly Ala Lys Gly Asp	
75 80 85	
gga aaa aca tat gat aat att gtaagtattt aaatatggga atatatttgt	1787
Gly Lys Thr Tyr Asp Asn Ile	
90	
ggggatgaaa atgatagaga atataagaat tatttgggaag gatgaaaagt tatattttat	1847
aaagtagaaa attattttct cgttttttagt attaagggtga aaatgagttt ctcgttaagc	1907
gaggaaaagc tattttccat ggtaactgta tttttttttt actttttaata acgtcatagt	1967
atttgctata ctcaagaata agacacttat tattgatgat ttagtgctcg aaaagaaatt	2027
gatagtaatt ttgcttaata taactatcaa tttctttatat gtatattttt caaccaaatt	2087
aacaaagcgt aatccaataa gtgggcctct agaataaaga gtaagttcta ttcaattctt	2147
aaccttattt aatttttagtg gaaacctcga caaaaacgaa caaacgtatt caaactttta	2207
tattcggaat tcgagaccaa ccatatgaac aacctcacac atgcatatag tcctaataata	2267
tataattttt ctaaaaaata tcttcaatct accatattga aatattgaaa aatgactttt	2327
atcctatcga acacataatc aagagtttct ttttaagaatt taccactaca tttgggtatgt	2387

ttcttatcgt gttaaaatta tctttcag gca ttt gag caa gca tgg aat gaa	2439
Ala Phe Glu Gln Ala Trp Asn Glu	
95 100	
gca tgt tca tct aga aca cct gtt caa ttt gtg gtt cct aaa aac aag	2487
Ala Cys Ser Ser Arg Thr Pro Val Gln Phe Val Val Pro Lys Asn Lys	
105 110 115	
aat tat ctt ctc aag caa atc acc ttt tca ggt cca tgc aga tct tct	2535
Asn Tyr Leu Leu Lys Gln Ile Thr Phe Ser Gly Pro Cys Arg Ser Ser	
120 125 130	
att tca gta aag gttagcatat tgattattta tctctcttt gttagcaata	2587
Ile Ser Val Lys	
135	
tattatctgg tttatgacaa aatttaagaa agtaatcaaa gatagataaa caatgaattt	2647
tcgtcactaa tttagcggat tagtgaggaa ttatcaaaat gttatgtag ctatgagcaa	2707
cttagctatg aattagctag tgaagaagtt tgatgctaatt tctatttttt tttttagag	2767
taaagatatt tgaaacacat gtattaatta ttaattatgt cttaattaat atgtcaatgg	2827
atagttcaaa cttaaagaact gtcaaaagaa aataagaaag aaatatttat ttttaaaata	2887
aattaaaaag aaaaatatga gaaataaatt caaagcgaga aggtattaca taatctatgg	2947
ggataaaagg atattatata tgtaagaaaa cagcactaca catatctaatt aaagtctcat	3007
aaatggatat aaaaaatagt gtgtaagcaa cagttatccc tacaaaaact tttgtgggg	3067
agatcgatcc agaggttggt tccagactct tgcttaaaaa aaatgttttt tctaaataag	3127
tttgaaagaa atgttatatg atgaaaatat gaagaaaaac atatcaatat taaaaataat	3187
aaagtaatca aagtaaacga aataacaata ggaataatac tcataaatga aaatttagtg	3247
gcttttcggt aacataatct tagtttatcc attgtttctt taatttcctt tcttattttt	3307
tttgaaatta ctaatgcag att ttt gga tcc tta gaa gca tct agt aaa att	3359
Ile Phe Gly Ser Leu Glu Ala Ser Ser Lys Ile	
140 145	
tca gac tac aaa gat aga agg ctt tgg att gct ttt gat agt gtt caa	3407
Ser Asp Tyr Lys Asp Arg Arg Leu Trp Ile Ala Phe Asp Ser Val Gln	
150 155 160	
aat tta gtt gtt gga gga gga gga act atc aat ggc aat gga caa gta	3455
Asn Leu Val Val Gly Gly Gly Gly Thr Ile Asn Gly Asn Gly Gln Val	
165 170 175 180	
tgg tgg cca agt tct tgc aaa ata aat aaa tca ctg gtaattttat	3501
Trp Trp Pro Ser Ser Cys Lys Ile Asn Lys Ser Leu	
185 190	

aaccttgctt ataagtttta cgctatgttg ctogaattct ttaaacttgt tctaaagata	3561
ttatatattt gaaggagggtg tcacaaatgc atcacatttt tagagattcc gaccaatatt	3621
agttttatgt aatctaattt tcagagcatt tttgccttgt actgatcatt gttacccttt	3681
ttttcttcat gcag cca tgc agg gat gca cca acg gtacgttaat tgcatttgat	3736
Pro Cys Arg Asp Ala Pro Thr	
195	
ttgataaaaa aaaaaagcct aaaatatatt tgaattttta ttgaaagggtt ataataattc	3796
ttaacttttg gcaggaccta ttacccttg cactatttaa tagtgtattt taaagatata	3856
aaagtgttta gttgaaacaa aaatttagat attcaaaaac tatttgaaaa ttactataaa	3916
ttgcaatttt tttgcatatc aatatgatta aaaaatatta gttaaagtcc ttatgatttg	3976
attctaaaaa taaaaatcat gacaaacaat agtagacgga gaaagtatat aacaatacct	4036
cttcaagtag aatcgatttg tacacacacc tcaaaacctt cgttttcttc gatttatatt	4096
tcctatttct tttaatagta atcaaaggct attagttctg tcaaaatcta tacattggaa	4156
actctatctt tgacgcctcg tacattcgag atcgttgaac aatggatgaa tgattattta	4216
actttgtatt taaatattaa aactaatatt gtttaatttt cag gcc tta acc ttc	4271
Ala Leu Thr Phe	
200	
tgg aat tgc aaa aat ttg aaa gtg aat aat cta aag agt aaa aat gca	4319
Trp Asn Cys Lys Asn Leu Lys Val Asn Asn Leu Lys Ser Lys Asn Ala	
205 210 215	
caa caa att cat atc aaa ttt gag tca tgc act aat gtt gta gct tca	4367
Gln Gln Ile His Ile Lys Phe Glu Ser Cys Thr Asn Val Val Ala Ser	
220 225 230 235	
aat ttg atg atc aat gct tca gca aag agc cca aat act gat gga gtc	4415
Asn Leu Met Ile Asn Ala Ser Ala Lys Ser Pro Asn Thr Asp Gly Val	
240 245 250	
cat gta tca aat act caa tat att caa ata tct gat act att att gga	4463
His Val Ser Asn Thr Gln Tyr Ile Gln Ile Ser Asp Thr Ile Ile Gly	
255 260 265	
aca g gtttatttat ttaattttta tttatccaat ttaattagaa aaaaaaagga	4517
Thr	
gtatttttat ttgataacta aattattaat ttttaatttt tttttatag gt gat gat	4574
Gly Asp Asp	
270	
tgt att tca att gtt tct gga tct caa aat gtg cag gcc aca aat att	4622
Cys Ile Ser Ile Val Ser Gly Ser Gln Asn Val Gln Ala Thr Asn Ile	
275 280 285	

act tgt ggt cca ggt cat ggt ata ag gtactctatt ttacaaatat	4668
Thr Cys Gly Pro Gly His Gly Ile Ser	
290 295	
acttgtttcc attttctcta ttccataaaa ggtagtatga tataataatt actttaaatc	4728
ctttaattaa ttatttgcca aattttttct cttgtcttta tggtaaatga cttagcacia	4788
taattagggc cgtttggatg ggccaataaa agcagcttta aaaaagtact tttaaaagtg	4848
ttgaaactta tttttaaaat aagcagttat cggtttgatg aaaagtgtg aagttgttat	4908
gtcaaactg aaaagggaaa aatggaagaa agaaatgtta gggttatatg ggttatttgt	4968
ataaaaatat taagcaciaa aagataaaaa tgtgggtcaac ttaaaacaac ttataagcta	5028
ccctacccta cccagcttt taacttttgg cttaaaataa gttttttttt ttaaaactta	5088
aaataagttg ttttgagtat tgccaaagag cttaaataatg caaaaaccag cttttaagtc	5148
agtttgacca gcttttaagc tgagccaaac aggcctctta aatgtctgct tagatgtgct	5208
atatatatat gagctttttt tgaagtagta tattatcctt aagttcaaca taaaatacat	5268
gctttaacat agcacatata gttaatcaaa agacgaaatg atgaataatt ttgcgaattt	5328
gattattcac aagaaaagg atagttcaaa gtgtacattt caatgaattg aagatatcat	5388
aaagactaaa attagaagaa tcaataattg agggatcaaa aatgttatta cttattaaa	5448
atactattcc attttcatat taaattaact aattaagagt gttttataat ctaataaaac	5508
atgcaataat tattgacgaa atgtggtttt ggtacctata atctttctga atatttgctc	5568
tattttttct ctttttatat ttccatggat tac t att gga agc tta gga tct	5620
Ile Gly Ser Leu Gly Ser	
300	
gga aat tca gaa gct tat gtg tct aat gtt act gta aat gaa gcc aaa	5668
Gly Asn Ser Glu Ala Tyr Val Ser Asn Val Thr Val Asn Glu Ala Lys	
305 310 315	
att atc ggt gcc gaa aat gga gtt agg atc aag act tgg cag	5710
Ile Ile Gly Ala Glu Asn Gly Val Arg Ile Lys Thr Trp Gln	
320 325 330	
gtaccctccc ccccccccc cccccacag gccattttt ttaattttt ttaaattttt	5770
attcgaatat caatattaaa gattaatttg atttcatgtt tgaaatttat atttggataa	5830
agtatgtatt ttactagctt tctatgttat atagaaaaaa aaatgttcag aacttcagat	5890
tattgtactc gtactaagtg taaatgtgtt gctttgttta gaagtttggg ttatccagtt	5950
ttgggtcatg attaaaccaa acttataatg aaaaggggct gcaacggccg gccactagt	6010

gctagtatca ataggaagat ctcacgtctg tttattcaga tggacgttct tggttgaatg	6070
ttaataatta taaattcaat taacatgtaa ttaagcatta tataaattaa tgtggtttaa	6130
taatgtag gga gga tct gga caa gct agc aac atc aaa ttt ctg aat gtg	6180
Gly Gly Ser Gly Gln Ala Ser Asn Ile Lys Phe Leu Asn Val	
335 340 345	
gaa atg caa gac gtt aag tat ccc ata att ata gac caa aac tat tgt	6228
Glu Met Gln Asp Val Lys Tyr Pro Ile Ile Ile Asp Gln Asn Tyr Cys	
350 355 360	
gat cga gtt gaa cca tgt ata caa cag gtaatttttt attaacgaac	6275
Asp Arg Val Glu Pro Cys Ile Gln Gln	
365 370	
aatttattat attttattac ttcttaaadc accttacatc attaaaactt tgagattctt	6335
ttcactagtt agtaactttt tgaatagatt tttagtaaag gatattcatt attcctttta	6395
tttttcttct aatttatgga tcttttggac tatgggtctaa aaatcttggt aaagtaaact	6455
gaatatcata agaaaaaatg ttagattata atctaaattt tttataaatt attagacgtt	6515
atctaataatt ttgtatgtaa gattgagaaa catatacata aaacattaga ttcaaattta	6575
ataatatcta aaatattgat tcaaataaat catgactaca caaacgaata catgcagatt	6635
ctcaaacata tagatgaagt catttcaaaa cgaatcaaat atagtagagt atatccttaa	6695
aagagagcat ttgggtaaat aagtaaaaat cattaagtta taaaaaaaat tctaactcga	6755
tctctcagca ttatttaate actttgttcc ag ttt tca gca gtt caa gtg aaa	6808
Phe Ser Ala Val Gln Val Lys	
375	
aat gtg gtg tat gag aat atc aag ggc aca agt gca aca aag gtg gcc	6856
Asn Val Val Tyr Glu Asn Ile Lys Gly Thr Ser Ala Thr Lys Val Ala	
380 385 390	
ata aaa ttt gat tgc agc aca aac ttt cca tgt gaa gga att ata atg	6904
Ile Lys Phe Asp Cys Ser Thr Asn Phe Pro Cys Glu Gly Ile Ile Met	
395 400 405 410	
gag aat ata aat tta gta ggg gaa agt gga aaa cca tca gag gct acg	6952
Glu Asn Ile Asn Leu Val Gly Glu Ser Gly Lys Pro Ser Glu Ala Thr	
415 420 425	
tgc aaa aat gtc cat ttt aac aat gct gaa cat gtt aca cca cac tgc	7000
Cys Lys Asn Val His Phe Asn Asn Ala Glu His Val Thr Pro His Cys	
430 435 440	
act tca cta gaa att tca gag gat gaa gct ctt ttg tat aat tat	7045
Thr Ser Leu Glu Ile Ser Glu Asp Glu Ala Leu Leu Tyr Asn Tyr	
445 450 455	
taatttatatc tatagatctt caatatatag cagatatgat atatcacaat aaacaaatct	7105

atatctatgt attgaataat tattattaat atgtacggat tgaagtttta ataagactac 7165
 tatgtatttc tattttctag tcaaaagttt gacgattgta ctttttaatg tacaaaaata 7225
 ataaaaatggg tatttatatg atgtatatat ccccttggtg tttcttggtg aactataatg 7285
 tcattattta ataactatta tctgtgcaat gattgtatgt gttaatgata cataatatat 7345
 ctttcatcat tgataataag aataaaatat ttacgtcta ttactttgtg aattatatgt 7405
 agatttttagt ttttggttta tttttaatta aaccgagtga aatataaaga g 7456

<210> 2
 <211> 457
 <212> PRT
 <213> Lycopersicon esculentum

<400> 2

Met Val Ile Gln Arg Asn Ser Ile Leu Leu Leu Ile Ile Ile Phe Ala
 1 5 10 15

Ser Ser Ile Ser Thr Cys Arg Ser Asn Val Ile Asp Asp Asn Leu Phe
 20 25 30

Lys Gln Val Tyr Asp Asn Ile Leu Glu Gln Glu Phe Ala His Asp Phe
 35 40 45

Gln Ala Tyr Leu Ser Tyr Leu Ser Lys Asn Ile Glu Ser Asn Asn Asn
 50 55 60

Ile Asp Lys Val Asp Lys Asn Gly Ile Lys Val Ile Asn Val Leu Ser
 65 70 75 80

Phe Gly Ala Lys Gly Asp Gly Lys Thr Tyr Asp Asn Ile Ala Phe Glu
 85 90 95

Gln Ala Trp Asn Glu Ala Cys Ser Ser Arg Thr Pro Val Gln Phe Val
 100 105 110

Val Pro Lys Asn Lys Asn Tyr Leu Leu Lys Gln Ile Thr Phe Ser Gly
 115 120 125

Pro Cys Arg Ser Ser Ile Ser Val Lys Ile Phe Gly Ser Leu Glu Ala
 130 135 140

Ser Ser Lys Ile Ser Asp Tyr Lys Asp Arg Arg Leu Trp Ile Ala Phe
145 150 155 160

Asp Ser Val Gln Asn Leu Val Val Gly Gly Gly Gly Thr Ile Asn Gly
165 170 175

Asn Gly Gln Val Trp Trp Pro Ser Ser Cys Lys Ile Asn Lys Ser Leu
180 185 190

Pro Cys Arg Asp Ala Pro Thr Ala Leu Thr Phe Trp Asn Cys Lys Asn
195 200 205

Leu Lys Val Asn Asn Leu Lys Ser Lys Asn Ala Gln Gln Ile His Ile
210 215 220

Lys Phe Glu Ser Cys Thr Asn Val Val Ala Ser Asn Leu Met Ile Asn
225 230 235 240

Ala Ser Ala Lys Ser Pro Asn Thr Asp Gly Val His Val Ser Asn Thr
245 250 255

Gln Tyr Ile Gln Ile Ser Asp Thr Ile Ile Gly Thr Gly Asp Asp Cys
260 265 270

Ile Ser Ile Val Ser Gly Ser Gln Asn Val Gln Ala Thr Asn Ile Thr
275 280 285

Cys Gly Pro Gly His Gly Ile Ser Ile Gly Ser Leu Gly Ser Gly Asn
290 295 300

Ser Glu Ala Tyr Val Ser Asn Val Thr Val Asn Glu Ala Lys Ile Ile
305 310 315 320

Gly Ala Glu Asn Gly Val Arg Ile Lys Thr Trp Gln Gly Gly Ser Gly
325 330 335

Gln Ala Ser Asn Ile Lys Phe Leu Asn Val Glu Met Gln Asp Val Lys
340 345 350

Tyr Pro Ile Ile Ile Asp Gln Asn Tyr Cys Asp Arg Val Glu Pro Cys
355 360 365

Ile Gln Gln Phe Ser Ala Val Gln Val Lys Asn Val Val Tyr Glu Asn

370	375	380
Ile Lys Gly Thr Ser Ala Thr Lys Val Ala Ile Lys Phe Asp Cys Ser		
385	390	395 400
Thr Asn Phe Pro Cys Glu Gly Ile Ile Met Glu Asn Ile Asn Leu Val		
	405	410 415
Gly Glu Ser Gly Lys Pro Ser Glu Ala Thr Cys Lys Asn Val His Phe		
	420	425 430
Asn Asn Ala Glu His Val Thr Pro His Cys Thr Ser Leu Glu Ile Ser		
	435	440 445
Glu Asp Glu Ala Leu Leu Tyr Asn Tyr		
450	455	

<210> 3
 <211> 25
 <212> DNA
 <213> Lycopersicon esculentum

<400> 3
 ttgagacggg agaagacaag ccaga 25

<210> 4
 <211> 28
 <212> DNA
 <213> Lycopersicon esculentum

<400> 4
 ccaaccatat gaacaacctc acacatgc 28

<210> 5
 <211> 26
 <212> DNA
 <213> Lycopersicon esculentum

<400> 5
 tgtggggtag atcgatccag aggttg 26

<210> 6
 <211> 25
 <212> DNA
 <213> Lycopersicon esculentum

<400> 6
 acgcctcgta cattcgagat cgttg 25

<210> 7	
<211> 27	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 7	
tcacaagaaa agggatagtt caaagtg	27
<210> 8	
<211> 26	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 8	
tgaagtcatt tcaaaacgaa tcaaat	26
<210> 9	
<211> 32	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 9	
ttctccttct cattattatt tttgcttcat ca	32
<210> 10	
<211> 30	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 10	
ctggaattgc aaaaatttga aagtgaataa	30
<210> 11	
<211> 26	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 11	
ttgagacggg agaagacaag ccagac	26
<210> 12	
<211> 27	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 12	
agtggctttc gtactacata atcttag	27
<210> 13	

<211> 28
<212> DNA
<213> Lycopersicon esculentum

<400> 13
catgcaataa ttattgacga aatgtggt 28

<210> 14
<211> 25
<212> DNA
<213> Lycopersicon esculentum

<400> 14
ttgagacggg agaagacaag ccaga 25

<210> 15
<211> 25
<212> DNA
<213> Lycopersicon esculentum

<400> 15
tgagacggga gaagacaagc cagac 25

<210> 16
<211> 32
<212> DNA
<213> Lycopersicon esculentum

<400> 16
ttctccttct cattattatt tttgcttcat ca 32

<210> 17
<211> 30
<212> DNA
<213> Lycopersicon esculentum

<400> 17
ctggaattgc aaaaatttga aagtgaataa 30

<210> 18
<211> 33
<212> DNA
<213> Lycopersicon esculentum

<400> 18
ttgacgaaat gtggtttttg tacctataat ctt 33

<210> 19
<211> 30
<212> DNA
<213> Lycopersicon esculentum

<400> 19	
cacaaacgaa tacatgcaga ttctcaaaca	30
<210> 20	
<211> 28	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 20	
ccaaccatat gaacaacctc acacatgc	28
<210> 21	
<211> 28	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 21	
atcttcaatc taccatattg aaatattg	28
<210> 22	
<211> 26	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 22	
tacatttggt agtgtttctt atcgtg	26
<210> 23	
<211> 27	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 23	
agtggctttc gtactacata atcttag	27
<210> 24	
<211> 32	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 24	
caaaagacga aatgatgaat aattttgcga at	32
<210> 25	
<211> 30	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 25	
cacaaacgaa tacatgcaga ttctcaaaca	30

<210> 26
<211> 26
<212> DNA
<213> Lycopersicon esculentum

<400> 26
agtagagtat atccttaaaa gagagc 26

<210> 27
<211> 25
<212> DNA
<213> Lycopersicon esculentum

<400> 27
acgcctctga cattcgagat cgttg 25

<210> 28
<211> 27
<212> DNA
<213> Lycopersicon esculentum

<400> 28
ccatggaaaa tagcttttcc tcgctta 27

<210> 29
<211> 30
<212> DNA
<213> Lycopersicon esculentum

<400> 29
cattttgata attcctcact aatccgctaa 30

<210> 30
<211> 25
<212> DNA
<213> Lycopersicon esculentum

<400> 30
caaggggtaa taggtcctgc ccaaa 25

<210> 31
<211> 25
<212> DNA
<213> Lycopersicon esculentum

<400> 31
ctgcttttat tcgcccattcc aaacg 25

<210> 32

<211> 30
 <212> DNA
 <213> Lycopersicon esculentum

 <400> 32
 gaatctcaaa gttttaatga tgtaagggtga 30

 <210> 33
 <211> 29
 <212> DNA
 <213> Lycopersicon esculentum

 <400> 33
 ttatacaaaa gagcttcatc ctctgaaat 29

 <210> 34
 <211> 31
 <212> DNA
 <213> Lycopersicon esculentum

 <400> 34
 cctgtgtat acatggttca actcgatcac a 31

 <210> 35
 <211> 31
 <212> DNA
 <213> Lycopersicon esculentum

 <400> 35
 cctctgaaat ttctagttaa gtgcagtggtg g 31

 <210> 36
 <211> 28
 <212> DNA
 <213> Lycopersicon esculentum

 <400> 36
 tccatggaaa atgactttcc tcgcttac 28

 <210> 37
 <211> 31
 <212> DNA
 <213> Lycopersicon esculentum

 <400> 37
 atagaagatc tgcattgacc tgaaaagggtg a 31

 <210> 38
 <211> 29
 <212> DNA
 <213> Lycopersicon esculentum

<400> 38	
aagtaaatatt tgtggcctgc acatttgag	29
<210> 39	
<211> 35	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 39	
cctaattatt gtgctaagtc attaaccata aagac	35
<210> 40	
<211> 36	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 40	
gaccatagtc caaaagatcc ataaattaga agaaaa	36
<210> 41	
<211> 36	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 41	
tgacattata gttcaacaag aaatacctaaa gggata	36
<210> 42	
<211> 28	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 42	
accatggaaa atagctttcc tcgcttaa	28
<210> 43	
<211> 25	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 43	
caaaggggta atagtcctgc ccaaa	25
<210> 44	
<211> 26	
<212> DNA	
<213> Lycopersicon esculentum	
<400> 44	
ctacttttat tacgcccatac caaacg	26

<210> 45
<211> 34
<212> DNA
<213> Lycopersicon esculentum

<400> 45
aagtgtaaat gtgttgcttt gtttagaagt ttgg

34

<210> 46
<211> 36
<212> DNA
<213> Lycopersicon esculentum

<400> 46
tgaaaagaat ctcaaagttt taatgatgta aggtga

36

<210> 47
<211> 7456
<212> DNA
<213> Lycopersicon esculentum

<220>
<221> CDS
<222> (1479)..(1757)
<223>

<220>
<221> CDS
<222> (2416)..(2547)
<223>

<220>
<221> CDS
<222> (3327)..(3491)
<223>

<220>
<221> CDS
<222> (3696)..(3716)
<223>

<220>
<221> CDS
<222> (4260)..(4467)
<223>

<220>
<221> CDS

<222> (4567)..(4648)
<223>

<220>
<221> CDS
<222> (5602)..(5710)
<223>

<220>
<221> CDS
<222> (6139)..(6255)
<223>

<220>
<221> CDS
<222> (6788)..(7045)
<223>

<400> 47
aagcttctta aaaaggcaaa ttgattaatt tgaagtcaaa ataattaatt ataacaatgg 60
taaagcacct taagaaacca tagtttgaaa gggtaccaat gcgctatata ttaatcaact 120
tgataatata aaaaaaattt caattcgaaa agggcctaaa atattctcaa agtattcgaa 180
atgggtacaaa actaccatcc gtccacctat tgactccaaa ataaaaattat tatccacctt 240
tgagttttaa attgactact tatataacaa ttctaaattt aaactatttt aatactttta 300
aaaatacatg gcgttcaaat atttaatat atttaattta tgaatatcat ttataaacca 360
accaactacc aactcattaa tcattaaatc ccacccaaat tctactatca aaattgtcct 420
aaacactact aaaacaagac gaaattgttc gagtccgaat cgaagcacca atctaattta 480
ggttgagccg catatttagg aggacacttt caatagtatt tttttcaagc atgaatttga 540
aatttaagat taatggtaaa gaagtagtac acccgaatta attcatgcct tttttaaata 600
taattatata aatatttatg atttgtttta aatattaaaa cttgaatata ttatttttaa 660
aaaaattatc tattaagtac catcacataa ttgagacgag gaataattaa gatgaacata 720
gtgttttaatt agtaatggat gggtagtaaa tttatttata aattatatca ataagttaaa 780
ttataacaaa tatttgagcg ccattgtattt taaaaaatat taaataagtt tgaatttaaa 840
accgttagat aaatgggtcaa ttttgaaccc aaaagtggat gagaagggtta ttttagagcc 900
aataggggga tgagaaggat attttgaagc caatatgtga tggatggagg ataattttgt 960
atcatttcta atacttttaa gatatttttag gtcattttcc cttcttttagt ttatagacta 1020

tagtgtagt tcatcgaata tcatctatta tttccgtctt aaattatttt ttattttata	1080
aattttttaa aaataaatta tttttcccat ttaactttga ttgtaattaa tttttaaaaa	1140
ttaccaacat ataaataaaa ttaatatatta acaaagaatt gtaacataat atttttttta	1200
ttattcaaaa taaatatattt taaacatcat ataaaagaaa tacgacaaaa aaattgagac	1260
gggagaagac aagccagaca aaaatgtcca agaaactctt tcgtctaaat atctctcatc	1320
caaactaata taataccat tacaattaac catattgacc aactcaaacc ccttaaaatc	1380
tataaataga caaaccttcc ccatacctct tatcataaaa aaaataataa tctttttcaa	1440
tagacaagtt taaaaacat accatataac aatatatc atg gtt atc caa agg aat	1496
Met Val Ile Gln Arg Asn	
1 5	
agt att ctc ctt ctc att att att ttt gct tca tca att tca act tgt	1544
Ser Ile Leu Leu Leu Ile Ile Ile Phe Ala Ser Ser Ile Ser Thr Cys	
10 15 20	
aga agc aat gtt att gat gac aat tta ttc aaa caa gtt tat gat aat	1592
Arg Ser Asn Val Ile Asp Asp Asn Leu Phe Lys Gln Val Tyr Asp Asn	
25 30 35	
att ctt gaa caa gaa ttt gct cat gat ttt caa gct tat ctt tct tat	1640
Ile Leu Glu Gln Glu Phe Ala His Asp Phe Gln Ala Tyr Leu Ser Tyr	
40 45 50	
ttg agc aaa aat att gaa agc aac aat aat att gac aag gtt gat aaa	1688
Leu Ser Lys Asn Ile Glu Ser Asn Asn Asn Ile Asp Lys Val Asp Lys	
55 60 65 70	
aat ggg att aaa gtg att aat gta ctt agc ttt gga gct aag ggt gat	1736
Asn Gly Ile Lys Val Ile Asn Val Leu Ser Phe Gly Ala Lys Gly Asp	
75 80 85	
gga aaa aca tat gat aat att gtaagtattt aaatattgga atatatttgt	1787
Gly Lys Thr Tyr Asp Asn Ile	
90	
ggggatgaaa atgatagaga atataagaat tatttggaag gatgaaaagt tatattttat	1847
aaagtagaaa attattttct cgttttttagt attaaggtga aaatgagttt ctcgttaagc	1907
gaggaaaagc tattttccat ggtaactgta tttttttttt actttttaata acgtcatagt	1967
atttgctata ctcaagaata agacacttat tattgatgat ttagtgctcg aaaagaaatt	2027
gatagtaatt ttgcttaata taactatcaa tttcttatat gtatattttt caaccaaatt	2087
aacaaagcgt aatccaataa gtgggcctct agaataaaga gtaagttcta ttcaattctt	2147
aaccttattt aatttttagtg gaaacctcga caaaaacgaa caaacgtatt caaactttta	2207
tattcggaat tcgagaccaa ccatatgaac aacctcacac atgcatatag tcctaataata	2267

tataatTTTT ctAAAAaata tcttcaatct accatattga aatattgaaa aatgactttt	2327
atcctatcga acacataatc aagagtttct ttttaagaatt taccactaca tttggtatgt	2387
ttcttatcgt gttaaaatta tcttttcag gca ttt gag caa gca tgg aat gaa	2439
Ala Phe Glu Gln Ala Trp Asn Glu	
95 100	
gca tgt tca tct aga aca cct gtt caa ttt gtg gtt cct aaa aac aag	2487
Ala Cys Ser Ser Arg Thr Pro Val Gln Phe Val Val Pro Lys Asn Lys	
105 110 115	
aat tat ctt ctc aag caa atc acc ttt tca ggt cca tgc aga tct tct	2535
Asn Tyr Leu Leu Lys Gln Ile Thr Phe Ser Gly Pro Cys Arg Ser Ser	
120 125 130	
att tca gta aag gtttagcatat tgattattta tctctcttt gtttagcaata	2587
Ile Ser Val Lys	
135	
tattatctgg tttatgacaa aatttaagaa agtaatcaaa gatagataaa caatgaattt	2647
tcgtcactaa ttttagcggat tagtgaggaa ttatcaaaat gttatgttag ctatgagcaa	2707
cttagctatg aattagctag tgaagaagtt tgatgctaatt tctatttttt ttttgtagag	2767
taaagatatt tgaaacacat gtattaatta ttaattatgt cttaattaat atgtcaatgg	2827
atagttcaaa ctaaagaact gtcaaaaagaa aataagaaag aaatatattat ttttaaaata	2887
aattaaaaag aaaaatatga gaaataaatt caaagcgaga aggtattaca taatctatgg	2947
ggataaaagg atattatata tgtaagaaaa cagcactaca catatctaatt aaagtctcat	3007
aaatggatat aaaaaatagt gtgtaagcaa cagttatccc tacaaaaact tttgtgggggt	3067
agatcgatcc agaggttggt tccagactct tgcttaaaaa aaatgttttt tctaaataag	3127
tttgaaagaa atgttatatg atgaaaaatat gaagaaaaac atatcaatat taaaaataat	3187
aaagtaatca aagtaaacga aataacaata ggaataatac tcataaatga aaatttagtg	3247
gcttttcggt aacataatct tagtttattc attgtttctt taatttccct tcttattttt	3307
tttgaaatta ctaatgcag att ttt gga tcc tta gaa gca tct agt aaa att	3359
Ile Phe Gly Ser Leu Glu Ala Ser Ser Lys Ile	
140 145	
tca gac tac aaa gat aga agg ctt tgg att gct ttt gat agt gtt caa	3407
Ser Asp Tyr Lys Asp Arg Arg Leu Trp Ile Ala Phe Asp Ser Val Gln	
150 155 160	
aat tta gtt gtt gga gga gga gga act atc aat ggc aat aga caa gta	3455
Asn Leu Val Val Gly Gly Gly Gly Thr Ile Asn Gly Asn Arg Gln Val	
165 170 175 180	

tgg tgg cca agt tct tgc aaa ata aat aaa tca ctg gtaattttat	3501
Trp Trp Pro Ser Ser Cys Lys Ile Asn Lys Ser Leu	
185 190	
aaccttgctt ataagtttta cgctatgttg ctggaattct ttaaacttgt tctaaagata	3561
ttatatatatt gaaggagggtg tcacaaatgc atcacatttt tagagattcc gaccaatatt	3621
agttttatgt aatctaattt tcagagcatt tttgccttgt actgatcatt gttacccttt	3681
ttttcttcat gcag cca tgc agg gat gca cca acg gtacgttaat tgcatttgat	3736
Pro Cys Arg Asp Ala Pro Thr	
195	
ttgataaaaa aaaaaagcct aaaatatatt tgaattttaa ttgaaagggtt ataataattc	3796
ttacttttgg gcaggaccta ttaccccttg cactatttta tagtgtattt taaagatata	3856
aaagtgttta gttgaaacaa aaatttagat attcaaaaac tatttgaaaa ttactataaa	3916
ttgcaatttt tttgcatatc aatatgatta aaaaatatta gttaaagttc ttatgatttg	3976
attctaaaaa taaaaatcat gacaaacaat agtagacgga gaaagtatat aacaatacct	4036
cttcaagtag aatcgatttg tacacacacc tcaaaaccta cgttttcttc gatttatatt	4096
tcctattttct tttaatagta atcaaagggt attagttctg tcaaaatcta tacattggaa	4156
actctatctt tgacgcctcg tacattcgag atcgttgaac aatggatgaa tgattattta	4216
actttgtatt taaatattaa aactaatatt gtttaatttt cag gcc tta acc ttc	4271
Ala Leu Thr Phe	
200	
tgg aat tgc aaa aat ttg aaa gtg aat aat cta aag agt aaa aat gca	4319
Trp Asn Cys Lys Asn Leu Lys Val Asn Asn Leu Lys Ser Lys Asn Ala	
205 210 215	
caa caa att cat atc aaa ttt gag tca tgc act aat gtt gta gct tca	4367
Gln Gln Ile His Ile Lys Phe Glu Ser Cys Thr Asn Val Val Ala Ser	
220 225 230 235	
aat ttg atg atc aat gct tca gca aag agc cca aat act gat gga gtc	4415
Asn Leu Met Ile Asn Ala Ser Ala Lys Ser Pro Asn Thr Asp Gly Val	
240 245 250	
cat gta tca aat act caa tat att caa ata tct gat act att att gga	4463
His Val Ser Asn Thr Gln Tyr Ile Gln Ile Ser Asp Thr Ile Ile Gly	
255 260 265	
aca g gtttatttat ttaattttta tttatccaat ttaattagaa aaaaaaagga	4517
Thr	
gtattttttat ttgataacta aattattaat ttttaatttt tttttatag gt gat gat	4574
Gly Asp Asp	
270	

tgt att tca att gtt tct gga tct caa aat gtg cag gcc aca aat att	4622
Cys Ile Ser Ile Val Ser Gly Ser Gln Asn Val Gln Ala Thr Asn Ile	
275 280 285	
act tgt ggt cca ggt cat ggt ata ag gtactctatt ttacaaatat	4668
Thr Cys Gly Pro Gly His Gly Ile Ser	
290 295	
acttgtttcc attttctcta tttcataaaa ggtagtatga tataataatt acttttaaadc	4728
ctttaattaa tttattggca aattttttct cttgtcttta tggtaaatga cttagcacaa	4788
taattagggc cgtttgatg ggcgaataaa agcagcttta aaaaagtact tttaaaagtg	4848
ttgaaactta tttttaaaat aagcagttat cggtttgatg aaaagtgtg aagttgttat	4908
gtcaaacgtg aaaagggaaa aatggaagaa agaaatgtta gggttatatg ggttatttgt	4968
ataaaaaatat taagcacaaa aagataaaaa tgtggtcaac ttaaaacaac ttataagcta	5028
ccctacccta cccagcttt taacttttgg cttaaaataa gttttttttt ttaaaactta	5088
aaataagttg ttttgagtat tgccaaagag ctaaataatg caaaaaccag cttttaagtc	5148
agtttgacca gcttttaagc tgagccaaac aggctcttaa aatgtctgct tagatgtgct	5208
atatatatatt gagctttttt tgaagtagta tattatcctt aagttcaaca taaaatacat	5268
gctttaacat agcacatata gttaatcaaa agacgaaatg atgaataatt ttgcgaattt	5328
gattattcac aagaaaagg atagttcaaa gtgtacattt caatgaattg aagatatcat	5388
aaagactaaa attagaagaa tcaataattg agggatcaaa aatgttatta cttattataa	5448
atactattcc attttcatat taaattaact aattaagagt gttttataat ctaataaaac	5508
atgcaataat tattgacgaa atgtggtttt ggtacctata atctttctga atatttgctc	5568
tattttttct ctttttatat ttccatggat tac t att gga agc tta gga tct	5620
Ile Gly Ser Leu Gly Ser	
300	
gga aat tca gaa gct tat gtg tct aat gtt act gta aat gaa gcc aaa	5668
Gly Asn Ser Glu Ala Tyr Val Ser Asn Val Thr Val Asn Glu Ala Lys	
305 310 315	
att atc ggt gcc gaa aat gga gtt agg atc aag act tgg cag	5710
Ile Ile Gly Ala Glu Asn Gly Val Arg Ile Lys Thr Trp Gln	
320 325 330	
gtaccctccc ccccccccc cccccacag gccattttt ttaattttt ttaaattttt	5770
attcgaatat caatattaaa gattaatttg atttcatgtt tgaaatttat atttggataa	5830
agtatgtatt ttactagctt tctatgttat atagaaaaaa aaatgttcag aacttcagat	5890

tattgtactc gtactaagtg taaatgtgtt gctttgttta gaagtttggg ttatccagtt	5950
ttgggtcatg attaaaccaa acttataatg aaaaggggct gcaacggccg gcccactagt	6010
gctagtatca ataggaagat ctcacgtctg tttattcaga tggacgttct tggttgaatg	6070
ttaataatta taaatttaat taacatgtaa ttaagcatta tataaattaa tgtgggttaa	6130
taatgtag gga gga tct gga caa gct agc aac atc aaa ttt ctg aat gtg	6180
Gly Gly Ser Gly Gln Ala Ser Asn Ile Lys Phe Leu Asn Val	
335 340 345	
gaa atg caa gac gtt aag tat ccc ata att ata gac caa aac tat tgt	6228
Glu Met Gln Asp Val Lys Tyr Pro Ile Ile Ile Asp Gln Asn Tyr Cys	
350 355 360	
gat cga gtt gaa cca tgt ata caa cag gtaatttttt attaacgaac	6275
Asp Arg Val Glu Pro Cys Ile Gln Gln	
365 370	
aatttattat attttattac ttcttaaadc accttacatc attaaaactt tgagattctt	6335
ttcactagtt agtaactttt tgaatagatt tttagtaaat gatattcatt attcctttta	6395
tttttcttct aatttatgga tcttttggac tatgggtctaa aaatcttggt aaagtaaact	6455
gaatatcata agaaaaaatg ttagattata atctaaattt tttataaatt attagacgtt	6515
atctaataatt ttgtatgtaa gattgagaaa catatacata aaacattaga ttcaaattta	6575
ataatatcta aaatattgat tcaaatacat catgactaca caaacgaata catgcagatt	6635
ctcaaacata tagatgaagt catttcaaaa cgaatcaaat atagtagagt atatccttaa	6695
aagagagcat ttgggtaaat aagtaaaaaat cattaagtta taaaaaaaaat tctaactcga	6755
tctctcacga ttatttaadc actttgttcc ag ttt tca gca gtt caa gtg aaa	6808
Phe Ser Ala Val Gln Val Lys	
375	
aat gtg gtg tat gag aat atc aag ggc aca agt gca aca aag gtg gcc	6856
Asn Val Val Tyr Glu Asn Ile Lys Gly Thr Ser Ala Thr Lys Val Ala	
380 385 390	
ata aaa ttt gat tgc agc aca aac ttt cca tgt gaa gga att ata atg	6904
Ile Lys Phe Asp Cys Ser Thr Asn Phe Pro Cys Glu Gly Ile Ile Met	
395 400 405 410	
gag aat ata aat tta gta ggg gaa agt gga aaa cca tca gag gct acg	6952
Glu Asn Ile Asn Leu Val Gly Glu Ser Gly Lys Pro Ser Glu Ala Thr	
415 420 425	
tgc aaa aat gtc cat ttt aac aat gct gaa cat gtt aca cca cac tgc	7000
Cys Lys Asn Val His Phe Asn Asn Ala Glu His Val Thr Pro His Cys	
430 435 440	
act tca cta gaa att tca gag gat gaa gct ctt ttg tat aat tat	7045

Thr Ser Leu Glu Ile Ser Glu Asp Glu Ala Leu Leu Tyr Asn Tyr
 445 450 455

taatttatac tatagatctt caatatatag cagatatgat atatcacaat aaacaaatct 7105
 atatctatgt attgaataat tattattaat atgtacggat tgaagtttta ataagactac 7165
 tatgtatttc tattttctag tcaaaagttt gacgattgta ctttttaatg tacaaaaata 7225
 ataaaatggg tatttatatg atgtatatat ccctttggta tttcttggtg aactataatg 7285
 tcattattta ataactatta tctgtgcaat gattgtattt gttaatgata cataatatat 7345
 ctttcatcat tgataataag aataaaatat ttacgtcta ttactttgtg aattatatgt 7405
 agattttagt ttttgtttta tttttaatta aaccgagtga aatataaaga g 7456

<210> 48
 <211> 457
 <212> PRT
 <213> Lycopersicon esculentum

<400> 48

Met Val Ile Gln Arg Asn Ser Ile Leu Leu Leu Ile Ile Ile Phe Ala
 1 5 10 15

Ser Ser Ile Ser Thr Cys Arg Ser Asn Val Ile Asp Asp Asn Leu Phe
 20 25 30

Lys Gln Val Tyr Asp Asn Ile Leu Glu Gln Glu Phe Ala His Asp Phe
 35 40 45

Gln Ala Tyr Leu Ser Tyr Leu Ser Lys Asn Ile Glu Ser Asn Asn Asn
 50 55 60

Ile Asp Lys Val Asp Lys Asn Gly Ile Lys Val Ile Asn Val Leu Ser
 65 70 75 80

Phe Gly Ala Lys Gly Asp Gly Lys Thr Tyr Asp Asn Ile Ala Phe Glu
 85 90 95

Gln Ala Trp Asn Glu Ala Cys Ser Ser Arg Thr Pro Val Gln Phe Val
 100 105 110

Val Pro Lys Asn Lys Asn Tyr Leu Leu Lys Gln Ile Thr Phe Ser Gly
 115 120 125

Pro Cys Arg Ser Ser Ile Ser Val Lys Ile Phe Gly Ser Leu Glu Ala
130 135 140

Ser Ser Lys Ile Ser Asp Tyr Lys Asp Arg Arg Leu Trp Ile Ala Phe
145 150 155 160

Asp Ser Val Gln Asn Leu Val Val Gly Gly Gly Gly Thr Ile Asn Gly
165 170 175

Asn Arg Gln Val Trp Trp Pro Ser Ser Cys Lys Ile Asn Lys Ser Leu
180 185 190

Pro Cys Arg Asp Ala Pro Thr Ala Leu Thr Phe Trp Asn Cys Lys Asn
195 200 205

Leu Lys Val Asn Asn Leu Lys Ser Lys Asn Ala Gln Gln Ile His Ile
210 215 220

Lys Phe Glu Ser Cys Thr Asn Val Val Ala Ser Asn Leu Met Ile Asn
225 230 235 240

Ala Ser Ala Lys Ser Pro Asn Thr Asp Gly Val His Val Ser Asn Thr
245 250 255

Gln Tyr Ile Gln Ile Ser Asp Thr Ile Ile Gly Thr Gly Asp Asp Cys
260 265 270

Ile Ser Ile Val Ser Gly Ser Gln Asn Val Gln Ala Thr Asn Ile Thr
275 280 285

Cys Gly Pro Gly His Gly Ile Ser Ile Gly Ser Leu Gly Ser Gly Asn
290 295 300

Ser Glu Ala Tyr Val Ser Asn Val Thr Val Asn Glu Ala Lys Ile Ile
305 310 315 320

Gly Ala Glu Asn Gly Val Arg Ile Lys Thr Trp Gln Gly Gly Ser Gly
325 330 335

Gln Ala Ser Asn Ile Lys Phe Leu Asn Val Glu Met Gln Asp Val Lys
340 345 350

Tyr Pro Ile Ile Ile Asp Gln Asn Tyr Cys Asp Arg Val Glu Pro Cys

355

360

365

Ile Gln Gln Phe Ser Ala Val Gln Val Lys Asn Val Val Tyr Glu Asn
 370 375 380

Ile Lys Gly Thr Ser Ala Thr Lys Val Ala Ile Lys Phe Asp Cys Ser
 385 390 395 400

Thr Asn Phe Pro Cys Glu Gly Ile Ile Met Glu Asn Ile Asn Leu Val
 405 410 415

Gly Glu Ser Gly Lys Pro Ser Glu Ala Thr Cys Lys Asn Val His Phe
 420 425 430

Asn Asn Ala Glu His Val Thr Pro His Cys Thr Ser Leu Glu Ile Ser
 435 440 445

Glu Asp Glu Ala Leu Leu Tyr Asn Tyr
 450 455

<210> 49
 <211> 7456
 <212> DNA
 <213> Lycopersicon esculentum

<220>
 <221> CDS
 <222> (1479)..(1757)
 <223>

<220>
 <221> CDS
 <222> (2416)..(2547)
 <223>

<220>
 <221> CDS
 <222> (3327)..(3491)
 <223>

<220>
 <221> CDS
 <222> (3696)..(3716)
 <223>

<220>

<221> CDS
<222> (4260)..(4467)
<223>

<220>
<221> CDS
<222> (4567)..(4648)
<223>

<220>
<221> CDS
<222> (5602)..(5710)
<223>

<220>
<221> CDS
<222> (6139)..(6255)
<223>

<220>
<221> CDS
<222> (6788)..(7045)
<223>

<400> 49
aagcttctta aaaaggcaaa ttgattaatt tgaagtcaaa ataattaatt ataacaatgg 60
taaagcacct taagaaacca tagtttgaaa ggttaccaat gcgctatata ttaatcaact 120
tgataatata aaaaaaattt caattcgaaa agggcctaaa atattctcaa agtattcgaa 180
atggtacaaa actaccatcc gtccacctat tgactccaaa ataaaattat tatccacctt 240
tgagtttaaa attgactact tatataacaa ttctaaattt aaactatttt aatactttta 300
aaaatacatg gcgttcaaat atttaatat atttaattta tgaatatcat ttataaacca 360
accaactacc aactcattaa tcattaaatc ccacccaaat tctactatca aaattgtcct 420
aaacactact aaaacaagac gaaattgttc gagtccgaat cgaagcacca atctaattta 480
ggttgagccg catatttagg aggacacttt caatagtatt tttttcaagc atgaatttga 540
aatttaagat taatggtaaa gaagtagtac acccgaatta attcatgcct tttttaaata 600
taattatata aatatttatg atttgtttta aatattaaaa cttgaatata ttatttttaa 660
aaaaattatc tattaagtac catcacataa ttgagacgag gaataattaa gatgaacata 720
gtgtttaatt agtaatggat gggtagtaaa tttatttata aattatatca ataagttaaa 780
ttataacaaa tatttgagcg ccatgtattt taaaaaatat taaataagtt tgaatttaaa 840

accgtagat aaatgggtcaa ttttgaaccc aaaagtggat gagaagggta ttttagagcc	900
aataggggga tgagaaggat attttgaagc caatatgtga tggatggagg ataattttgt	960
atcatttcta atactttaaa gatatttttag gtcattttcc cttctttagt ttatagacta	1020
tagtgtagt tcatcgaata tcatctatta tttccgtctt aaattatttt ttattttata	1080
aatttttaaa aaataaatta ttttttccat ttaactttga ttgtaattaa tttttaaaaa	1140
ttaccaacat ataaataaaaa ttaatatatta acaaagaatt gtaacataat atttttttta	1200
ttattcaaaa taaatatttt taaacatcat ataaaagaaa tacgacaaaa aaattgagac	1260
gggagaagac aagccagaca aaaatgtcca agaaactctt tcgtctaaat atctctcatc	1320
caaactaata taatacccat tacaattaac catattgacc aactcaaacc ccttaaaatc	1380
tataaataga caaaccttc ccatacctct tatcataaaa aaaataataa tctttttcaa	1440
tagacaagtt taaaaacat accatataac aatatatc atg gtt atc caa agg aat	1496
Met Val Ile Gln Arg Asn	
1 5	
agt att ctc ctt ctc att att att ttt gct tca tca att tca act tgt	1544
Ser Ile Leu Leu Leu Ile Ile Ile Phe Ala Ser Ser Ile Ser Thr Cys	
10 15 20	
aga agc aat gtt att gat gac aat tta ttc aaa caa gtt tat gat aat	1592
Arg Ser Asn Val Ile Asp Asp Asn Leu Phe Lys Gln Val Tyr Asp Asn	
25 30 35	
att ctt gaa caa gaa ttt gct cat gat ttt caa gct tat ctt tct tat	1640
Ile Leu Glu Gln Glu Phe Ala His Asp Phe Gln Ala Tyr Leu Ser Tyr	
40 45 50	
ttg agc aaa aat att gaa agc aac aat aat att gac aag gtt gat aaa	1688
Leu Ser Lys Asn Ile Glu Ser Asn Asn Asn Ile Asp Lys Val Asp Lys	
55 60 65 70	
aat ggg att aaa gtg att aat gta ctt agc ttt gga gct aag ggt gat	1736
Asn Gly Ile Lys Val Ile Asn Val Leu Ser Phe Gly Ala Lys Gly Asp	
75 80 85	
gga aaa aca tat gat aat att gtaagtattt aaatattgga atatatttgt	1787
Gly Lys Thr Tyr Asp Asn Ile	
90	
ggggatgaaa atgatagaga atataagaat tatttggag gatgaaaagt tatattttat	1847
aaagtagaaa attattttct cgtttttagt attaaggatga aaatgagttt ctcgttaagc	1907
gaggaaaagc tatttttccat ggtaactgta tttttttttt acttttaata acgtcatagt	1967
atgtgtata ctcaagaata agacacttat tattgatgat ttagtgctcg aaaagaaatt	2027

gatagtaatt ttgcttaata taactatcaa tttcttatat gtatatTTTT caaccAAAAT	2087
aacaaagcgt aatccaataa gtgggcctct agaataaaga gtaagttcta ttcaattctt	2147
aaccttattt aatttttagtg gaaacctcga cAAAAacgaa caaacgtatt caaactttta	2207
tattcggaat tcgagaccaa ccatatgaac aacctcacac atgcatatag tcctaataata	2267
tataatTTTT ctaaaaaata tcttcaatct accatattga aatattgaaa aatgactttt	2327
atcctatcga acacataatc aagagtttct ttttaagaatt taccactaca tttggtatgt	2387
ttcttatcgt gttaaaatta tctttcag gca ttt gag caa gca tgg aat gaa	2439
Ala Phe Glu Gln Ala Trp Asn Glu	..
95 100	
gca tgt tca tct aga aca cct gtt caa ttt gtg gtt cct aaa aac aag	2487
Ala Cys Ser Ser Arg Thr Pro Val Gln Phe Val Val Pro Lys Asn Lys	
105 110 115	
aat tat ctt ctc aag caa atc acc ttt tca ggt cca tgc aga tct tct	2535
Asn Tyr Leu Leu Lys Gln Ile Thr Phe Ser Gly Pro Cys Arg Ser Ser	
120 125 130	
att tca gta aag gttagcatat tgattattta tctctcttt gttagcaata	2587
Ile Ser Val Lys	
135	
tattatctgg tttatgacaa aatttaagaa agtaatcaaa gatagataaa caatgaattt	2647
tcgtcactaa ttttagcggt tagtgaggaa ttatcaaaat gttatgtag ctatgagcaa	2707
cttagctatg aattagctag tgaagaagtt tgatgctaatt tctatttttt ttttgtagag	2767
taaagatatt tgaaacacat gtattaatta ttaattatgt cttaattaat atgtcaatgg	2827
atagttcaaa ctaaagaact gtcaaaagaa aataagaaag aaatatttat ttttaaaata	2887
aattaaaaag aaaaatatga gaaataaatt caaagcgaga aggtattaca taatctatgg	2947
ggataaaagg atattatata tgtaagaaaa cagcactaca catatctaatt aaagtctcat	3007
aaatggatat aaaaaatagt gtgtaagcaa cagttatccc tacaaaaact tttgtggggt	3067
agatcgatcc agaggttggt tccagactct tgcttaaaaa aaatgttttt tctaaataag	3127
tttgaaagaa atgttatatg atgaaaatat gaagaaaaac atatcaatat taaaaataat	3187
aaagtaatca aagtaaacga aataacaata ggaataatac tcataaatga aaatttagtg	3247
gcttttcggt aacataatct tagtttatct attgtttctt taatttcctt tcttattttt	3307
tttgaaatta ctaatgcag att ttt gga tcc tta gaa gca tct agt aaa att	3359
Ile Phe Gly Ser Leu Glu Ala Ser Ser Lys Ile	
140 145	
tca gac tac aaa gat aga agg ctt tgg att gct ttt gat agt gtt caa	3407

Ser Asp Tyr Lys Asp Arg Arg Leu Trp Ile Ala Phe Asp Ser Val Gln	
150 155 160	
aat tta gtt gtt gga gga gga gga act atc aat ggc aat gga caa gta	3455
Asn Leu Val Val Gly Gly Gly Gly Thr Ile Asn Gly Asn Gly Gln Val	
165 170 175 180	
tgg tgg cca agt tct tgc aaa ata aat aaa tca ctg gtaattttat	3501
Trp Trp Pro Ser Ser Cys Lys Ile Asn Lys Ser Leu	
185 190	
aaccttgctt ataagtttta cgctatgttg ctggaattct ttaaacttgt tctaaagata	3561
ttatatattt gaaggagggtg tcacaaatgc atcacatttt tagagattcc gaccaatatt	3621
agtttttatgt aatctaattt tcagagcatc tttgccttgt actgatcatt gttacccttt	3681
ttttcttcat gcag cca tgc agg gat gca cca acg gtacgttaat tgcatttgat	3736
Pro Cys Arg Asp Ala Pro Thr	
195	
ttgataaaaa aaaaaagcct aaaatatatt tgaattttta ttgaaagggtt ataataattc	3796
ttaacttttg gcaggaccta ttacccttg cactatttta tagtgtattt taaagatata	3856
aaagtgttta gttgaaacaa aaatttagat attcaaaaac tatttgaaaa ttactataaa	3916
ttgcaatttt tttgcatatc aatatgatta aaaaatatta gttaaagttc ttatgatttg	3976
attctaaaaa taaaaatcat gacaaacaat agtagacgga gaaagtatat aacaatacct	4036
cttcaagtag aatcgatttg tacacacacc tcaaaacctc cgttttcttc gatttatatt	4096
tcctattttc tttaatagta atcaaaggct attagttctg tcaaaatcta tacattggaa	4156
actctatctt tgacgcctcg tacattcgag atcggtgaac aatggatgaa tgattattta	4216
actttgtatt taaatattaa aactaatatt gtttaatttt cag gcc tta acc ttc	4271
Ala Leu Thr Phe	
200	
tgg aat tgc aaa aat ttg aaa gtg aat aat cta aag agt aaa aat gca	4319
Trp Asn Cys Lys Asn Leu Lys Val Asn Asn Leu Lys Ser Lys Asn Ala	
205 210 215	
caa caa att cat atc aaa ttt gag tca tgc act aat gtt gta gct tca	4367
Gln Gln Ile His Ile Lys Phe Glu Ser Cys Thr Asn Val Val Ala Ser	
220 225 230 235	
aat ttg atg atc aat gct tca gca aag agc cca aat act gat gga gtc	4415
Asn Leu Met Ile Asn Ala Ser Ala Lys Ser Pro Asn Thr Asp Gly Val	
240 245 250	
caa gta tca aat act caa tat att caa ata tct gat act att att gga	4463
Gln Val Ser Asn Thr Gln Tyr Ile Gln Ile Ser Asp Thr Ile Ile Gly	
255 260 265	

aca g gtttatttat ttaattttta tttatccaat ttaattagaa aaaaaaagga 4517
Thr

gtatttttat ttgataacta aattattaat ttttaatttt tttttatag gt gat gat 4574
Gly Asp Asp
270

tgt att tca att gtt tct gga tct caa aat gtg cag gcc aca aat att 4622
Cys Ile Ser Ile Val Ser Gly Ser Gln Asn Val Gln Ala Thr Asn Ile
275 280 285

act tgt ggt cca ggt cat ggt ata ag gtactctatt ttacaaatat 4668
Thr Cys Gly Pro Gly His Gly Ile Ser
290 295

acttgtttcc attttctcta tttcataaaa ggtagtatga tataataatt actttaaatc 4728

ctttaattaa tttattggca aattttttct cttgtcttta tggttaatga cttagcacaa 4788

taattagggc cgtttggatg ggcgaataaa agcagcttta aaaaagtact tttaaaagtg 4848

ttgaaactta tttttaaaat aagcagttat cggtttggat aaaagtgctg aagttgttat 4908

gtcaaacgtg aaaagggaaa aatggaagaa agaaatgtta gggttatatg ggttatttgt 4968

ataaaaaatat taagcacaaa aagataaaaa tgtggtcaac ttaaaacaac ttataagcta 5028

ccctacccta cccagcttt taacttttgg cttaaaataa gtttttttt ttaaaaactta 5088

aaataagttg ttttgagtat tgccaaagag cttaaataatg caaaaaccag cttttaagtc 5148

agtttgacca gcttttaagc tgagccaaac aggctcttaa aatgtctgct tagatgtgct 5208

atatatatatt gagctttttt tgaagtagta tattatcctt aagttcaaca taaaatacat 5268

gctttaacat agcacatata gttaatcaaa agacgaaatg atgaataatt ttgcgaattt 5328

gattattcac aagaaaagg atagttcaaa gtgtacattt caatgaattg aagatatcat 5388

aaagactaaa attagaagaa tcaataattg agggatcaaa aatgttatta ccttattaaa 5448

atactattcc attttcatat taaattaact aattaagagt gttttataat ctaataaaac 5508

atgcaataat tattgacgaa atgtggtttt ggtacctata atctttctga atatttgctc 5568

tattttttct ctttttattt ttccatggat tac t att gga agc tta gga tct 5620
Ile Gly Ser Leu Gly Ser
300

gga aat tca gaa gct tat gtg tct aat gtt act gta aat gaa gcc aaa 5668
Gly Asn Ser Glu Ala Tyr Val Ser Asn Val Thr Val Asn Glu Ala Lys
305 310 315

att atc ggt gcc gaa aat gga gtt agg atc aag act tgg cag 5710
Ile Ile Gly Ala Glu Asn Gly Val Arg Ile Lys Thr Trp Gln
320 325 330

gtaccctccc cccccccccc cccccacag gccattttt ttaattttt ttaaattttt	5770
attcgaatat caatattaaa gattaatttg atttcatgtt tgaaatttat atttggataa	5830
agtatgtatt ttactagctt tctatgttat atagaaaaaa aaatgttcag aacttcagat	5890
tattgtactc gtactaagtg taaatgtgtt gctttgttta gaagtttggt ttatccagtt	5950
ttgggtcatg attaaaccaa acttataatg aaaaggggct gcaacggccg gccactagt	6010
gctagtatca ataggaagat ctcacgtctg tttattcaga tggacgttct tggttgaatg	6070
ttaataatta taaatttaat taacatgtaa ttaagcatta tataaattaa tgtgggttaa	6130
taatgtag gga gga tct gga caa gct agc aac atc aaa ttt ctg aat gtg	6180
Gly Gly Ser Gly Gln Ala Ser Asn Ile Lys Phe Leu Asn Val	
335 340 345	
gaa atg caa gac gtt aag tat ccc ata att ata gac caa aac tat tgt	6228
Glu Met Gln Asp Val Lys Tyr Pro Ile Ile Ile Asp Gln Asn Tyr Cys	
350 355 360	
gat cga gtt gaa cca tgt ata caa cag gtaatttttt attaacgaac	6275
Asp Arg Val Glu Pro Cys Ile Gln Gln	
365 370	
aatttattat attttattac ttcttaaate accttacatc attaaaactt tgagattctt	6335
ttcactagtt agtaactttt tgaatagatt tttagtaaat gatattcatt attcctttta	6395
tttttcttct aatttatgga tcttttggaac tatgggtctaa aaatcttggt aaagtaaact	6455
gaatatcata agaaaaaatg ttagattata atctaaattt tttataaatt attagacgtt	6515
atctaataatt ttgtatgtaa gattgagaaa catatacata aaacattaga ttcaaattta	6575
ataatatcta aaatattgat tcaaatacat catgactaca caaacgaata catgcagatt	6635
ctcaaacata tagatgaagt catttcaaaa cgaatcaaat atagtagagt atatccttaa	6695
aagagagcat ttgggtaaat aagtaaaaat cattaagtta taaaaaaaat tctaactcga	6755
tctctcacga ttatttaate actttgttcc ag ttt tca gca gtt caa gtg aaa	6808
Phe Ser Ala Val Gln Val Lys	
375	
aat gtg gtg tat gag aat atc aag ggc aca agt gca aca aag gtg gcc	6856
Asn Val Val Tyr Glu Asn Ile Lys Gly Thr Ser Ala Thr Lys Val Ala	
380 385 390	
ata aaa ttt gat tgc agc aca aac ttt cca tgt gaa gga att ata atg	6904
Ile Lys Phe Asp Cys Ser Thr Asn Phe Pro Cys Glu Gly Ile Ile Met	
395 400 405 410	
gag aat ata aat tta gta ggg gaa agt gga aaa cca tca gag gct acg	6952
Glu Asn Ile Asn Leu Val Gly Glu Ser Gly Lys Pro Ser Glu Ala Thr	

415	420	425	
tgc aaa aat gtc cat ttt aac aat gct gaa cat gtt aca cca cac tgc			7000
Cys Lys Asn Val His Phe Asn Asn Ala Glu His Val Thr Pro His Cys			
430	435	440	
act tca cta gaa att tca gag gat gaa gct ctt ttg tat aat tat			7045
Thr Ser Leu Glu Ile Ser Glu Asp Glu Ala Leu Leu Tyr Asn Tyr			
445	450	455	
taatttatac tatagatctt caatatatag cagatatgat atatcacaat aaacaaatct			7105
atatctatgt attgaataat tattattaat atgtacggat tgaagtttta ataagactac			7165
tatgtatttc tattttctag tcaaaagttt gacgattgta ctttttaatg tacaaaaata			7225
ataaaatggg tatttatatg atgtatatat ccctttggta tttcttggtg aactataatg			7285
tcattattta ataactatta tctgtgcaat gattgtattt gttaatgata cataatatat			7345
ctttcatcat tgataataag aataaaatat tttacgtcta ttactttgtg aattatatgt			7405
agattttagt ttttggttta tttttaatta aaccgagtga aatataaaga g			7456

<210> 50
 <211> 457
 <212> PRT
 <213> Lycopersicon esculentum

<400> 50

Met Val Ile Gln Arg Asn Ser Ile Leu Leu Leu Ile Ile Ile Phe Ala
1 5 10 15

Ser Ser Ile Ser Thr Cys Arg Ser Asn Val Ile Asp Asp Asn Leu Phe
20 25 30

Lys Gln Val Tyr Asp Asn Ile Leu Glu Gln Glu Phe Ala His Asp Phe
35 40 45

Gln Ala Tyr Leu Ser Tyr Leu Ser Lys Asn Ile Glu Ser Asn Asn Asn
50 55 60

Ile Asp Lys Val Asp Lys Asn Gly Ile Lys Val Ile Asn Val Leu Ser
65 70 75 80

Phe Gly Ala Lys Gly Asp Gly Lys Thr Tyr Asp Asn Ile Ala Phe Glu
85 90 95

Gln Ala Trp Asn Glu Ala Cys Ser Ser Arg Thr Pro Val Gln Phe Val

100	105	110
Val Pro Lys Asn Lys Asn Tyr Leu Leu Lys Gln Ile Thr Phe Ser Gly 115 120 125		
Pro Cys Arg Ser Ser Ile Ser Val Lys Ile Phe Gly Ser Leu Glu Ala 130 135 140		
Ser Ser Lys Ile Ser Asp Tyr Lys Asp Arg Arg Leu Trp Ile Ala Phe 145 150 155 160		
Asp Ser Val Gln Asn Leu Val Val Gly Gly Gly Gly Thr Ile Asn Gly 165 170 175		
Asn Gly Gln Val Trp Trp Pro Ser Ser Cys Lys Ile Asn Lys Ser Leu 180 185 190		
Pro Cys Arg Asp Ala Pro Thr Ala Leu Thr Phe Trp Asn Cys Lys Asn 195 200 205		
Leu Lys Val Asn Asn Leu Lys Ser Lys Asn Ala Gln Gln Ile His Ile 210 215 220		
Lys Phe Glu Ser Cys Thr Asn Val Val Ala Ser Asn Leu Met Ile Asn 225 230 235 240		
Ala Ser Ala Lys Ser Pro Asn Thr Asp Gly Val Gln Val Ser Asn Thr 245 250 255		
Gln Tyr Ile Gln Ile Ser Asp Thr Ile Ile Gly Thr Gly Asp Asp Cys 260 265 270		
Ile Ser Ile Val Ser Gly Ser Gln Asn Val Gln Ala Thr Asn Ile Thr 275 280 285		
Cys Gly Pro Gly His Gly Ile Ser Ile Gly Ser Leu Gly Ser Gly Asn 290 295 300		
Ser Glu Ala Tyr Val Ser Asn Val Thr Val Asn Glu Ala Lys Ile Ile 305 310 315 320		
Gly Ala Glu Asn Gly Val Arg Ile Lys Thr Trp Gln Gly Gly Ser Gly 325 330 335		

Gln Ala Ser Asn Ile Lys Phe Leu Asn Val Glu Met Gln Asp Val Lys
340 345 350

Tyr Pro Ile Ile Ile Asp Gln Asn Tyr Cys Asp Arg Val Glu Pro Cys
355 360 365

Ile Gln Gln Phe Ser Ala Val Gln Val Lys Asn Val Val Tyr Glu Asn
370 375 380

Ile Lys Gly Thr Ser Ala Thr Lys Val Ala Ile Lys Phe Asp Cys Ser
385 390 395 400

Thr Asn Phe Pro Cys Glu Gly Ile Ile Met Glu Asn Ile Asn Leu Val
405 410 415

Gly Glu Ser Gly Lys Pro Ser Glu Ala Thr Cys Lys Asn Val His Phe
420 425 430

Asn Asn Ala Glu His Val Thr Pro His Cys Thr Ser Leu Glu Ile Ser
435 440 445

Glu Asp Glu Ala Leu Leu Tyr Asn Tyr
450 455